Nuclear Operating Company

South Texas Project Electric Generating Station PO Box 289 Wadsworth, Texas 77483

October 24, 2002
NOC-AE-02001402
10CFR50.90
STI: 31488646

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Response to NRC Questions on
Proposed Change to Loss of Power and AC Sources Technical Specifications

Reference: Letter from J. J. Sheppard to Document Control Desk dated February 14, 2002, "Proposed Change to Loss of Power and AC Sources Technical Specifications" (NOC-AE-01001214)

STP Nuclear Operating Company (STPNOC) submitted the referenced proposed amendment to revise Technical Specification 3.3.2 requirements for Loss of Power Instrumentation (Functional Unit 8) and Technical Specifications 3.8.1.1, 3.8.1.2, and 3.8.1.3 for AC Sources.

The attached information addresses NRC questions addressed to STPNOC in the course of the NRC review. In addition, a corrected Technical Specification page 3/4 3-27 is attached. Action 20A b. was corrected to read "...less than the Total Number of Channels...". The mark-up page in the reference submittal is correct, but the revised page did not reflect the change.

STPNOC requests approval of the proposed amendment by December 15, 2002 to support implementation prior to the Unit 1 spring 2003 outage. STPNOC requests 60 days for implementation of the amendment after it is approved.

A001

If there are any questions regarding the proposed amendment, please contact Mr. A. W. Harrison (361) 972-7298 or me at (361) 972-7902.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on October 29, 2002.
Date

T. J. Jordan
Vice President
Engineering & Technical Services

awh/

Attachments:

1. Response to NRC Questions
2. Corrected Page 3/4 3-27

cc:
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STPNOC's response to the NRC reviewers' questions is provided below. Several of the NRC questions request that STPNOC address the risk acceptance criteria from Regulatory Guide (RG) 1.174 and RG 1.177 for the proposed changes to Technical Specification (TS). The original application was not submitted as risk-informed change because STPNOC believes the proposed changes can be justified deterministically within the current licensing basis. STPNOC has provided the requested risk assessments in this attachment.

NRC Questions and STP Responses:

1. Provide justification for plant operation for 72 hours with one, two, or three trains having their first and second levels of loss of power instrumentation configured in a one of three channels for actuation logic. Provide the results of analysis which demonstrates that the risk increase due to spurious actuation of the loss of voltage instrumentation is within the guidelines of RG 1.174 or RG 1.177.

2. Provide justification for unrestricted plant operation with one, two, or three trains having their first and second levels of loss of power instrumentation configured in a one of three channels for actuation logic. Provide the results of analysis which demonstrates that the risk increase due to spurious actuation of the loss of voltage instrumentation is within the guidelines of RG 1.174 or RG 1.177.

3. Provide justification for plant operation for 72 hours with one, two, or three trains having their first and second levels of loss of power instrumentation configured in a two of two channels for actuation logic. Provide the results of analysis which demonstrates that the risk increase due to the potential failure of actuation of the loss of voltage instrumentation due to single failure is within the guidelines of RG 1.174 or RG 1.177.

4. Provide justification for plant operation for 72 hours with one, two, or three trains having their first and second levels of loss of power instrumentation configured in a one of two channels for actuation logic. Provide the results of analysis which demonstrates that the risk increase due to spurious actuation of the loss of voltage instrumentation is within the guidelines of RG 1.174 or RG 1.177.

5. Provide justification for unrestricted plant operation with one, two, or three trains having their first and second levels of loss of power instrumentation configured in a one of two channels for actuation logic. Provide the results of analysis which demonstrates that the risk increase due to spurious actuation of the loss of voltage instrumentation is within the guidelines of RG 1.174 or RG 1.177.

Response:

Questions 1 through 5 are addressed together and deal with changes in actuation logic and allowed outage time (AOT) for the 4.16 kV ESF bus under-voltage, loss of power function. Information is requested for the risk increase associated with spurious relay actuation and relay failure under different actuation logic scenarios. For the limiting spurious relay actuation (1 of 2, or 1 of 3 logic gate), the 4.16 kV ESF bus is stripped, the Standby Diesel Generator (SDG) starts and loads the bus, and the required equipment loads onto the bus in a prescribed sequence (Mode II sequencer actuation). The spurious Mode II sequencer actuation does not result in a reactor trip or transient, therefore, there is no increase in core damage frequency.

The limiting relay actuation failure occurs when the actuation logic is reduced to 2 of 2. In this case, only one of the two relays can fail in order to fail the function. Although the current reference PRA model does not include basic events for the 4.16 kV undervoltage relays, the input relay failure can be simulated by increasing the likelihood of failure of the ESF load sequencer output relay basic events. The resulting change in core damage frequency is 4.0E-09 events/year using an average maintenance PRA model, which is well below the RG 1.174 guidance of 1.0E-06.

6. If an ESF load sequencer is inoperable, current TS (based on the definition for operability) requires that systems supported by the sequencer be declared inoperable. Systems supported by the sequencer include: the diesel generator standby onsite ac source, the offsite ac source, and required systems associated with (or connected to) the onsite (standby diesel generator) or offsite ac sources. These supported systems (based on the TS definition for operability) are considered inoperable.

Response:

STPNOC does not consider the off-site power source to be inoperable when the associated load sequencer is inoperable. Only the SDG associated with the sequencer and those components that are actuated by the sequencer for safety injection (SI) are inoperable. This is acceptable because in a Mode I actuation there is no loss of off-site power, no loads are stripped off the bus, and the sequencer only loads the required accident mitigation loads (e.g., SI). Thus the TS action for the accident mitigation components determine the required action time. There is a loss of off-site power associated with a Mode II or Mode III actuation; consequently, the SDG rendered inoperable by the inoperable sequencer governs the required TS actions. Application of the STP TS definition of operability does not require cascading inoperability of an emergency power source (e.g. SDG) to the equipment it would power. That is consistent with the generally accepted application of TS.

6.1. When an offsite and diesel generator ac sources are inoperable, current TS 3.8.1.1.c allows 12 hours to restore either the offsite or onsite ac source (i.e., the ESF load sequencer). Clarify how the new proposed TS 3.8.1.1.g will interact with current TS 3.8.1.1.c and the TS definition for operability.

Response:

Proposed TS 3.8.1.1.g would apply when there is one inoperable sequencer. As described above, only the associated SDG and components actuated by the sequencer in a Mode I sequence are considered inoperable. Because the sequencer is not considered a required support system for operability of the off-site power source, off-site power is not considered to be inoperable and TS 3.8.1.1.c does not apply in this condition.

6.2. When one diesel generator is inoperable, current TS 3.8.1.1.b allows 14 days and TS 3.8.1.1.d allows 24 hours to verify operability of required systems. If a required system [redundant to the inoperable required systems supported by the inoperable DG or offsite circuit] is found inoperable, the system TS would apply (i.e., 3.0.3) thus requiring shutdown.

Response:

TS 3.0.3 does not apply in this condition. STP TS 3.8.1.1.d has its own required shutdown action if the cross-train component is determined to be inoperable. The completion time is 24 hours, which was justified for the approval of Amendments 85/72 to the STP TS. The basis for the justification is that there is not a loss of safety function with two inoperable ESF trains.

6.2.1. Clarify how the new proposed TS 3.8.1.1.g will interact with current TS 3.8.1.1.d and the TS definition for operability.

Response:

An inoperable sequencer renders the associated SDG inoperable. TS 3.8.1.1.d would apply for cross-train components because of the inoperable SDG.

6.2.2. Explain how the current TS requirement for plant shutdown (when there is a loss of safety function conveyed by TS 3.8.1.1.d) will be maintained when there is an inoperable load sequencer.

Response: See the preceding responses.

6.2.3. The battery charger is a required system supported by either the offsite or onsite power source which should be considered inoperable (based on the definition for operability) when there is an inoperable ESF load sequencer. When the battery charger is inoperable, current TS 3.8.2.1.b allows 2 hours to restore the battery charger (i.e., the ESF load sequencer). Clarify how the new proposed TS 3.8.1.1.g will interact with current TS 3.8.1.1.c and the TS definition for operability.

Response:

The battery charger is a normal operating load and is not stripped for a Mode I (SI) sequence. Consequently, STP does not consider the battery charger to be inoperable due to an inoperable load sequencer because the off-site power to the charger is not made inoperable by an inoperable sequencer and operability of the charger's emergency power source (SDG) is not required for operability of the charger. This is consistent with the application of the STP Technical Specifications described in the response to Question 6.

6.2.4. If the dc system for one train (that is associated with the inoperable load sequencer) is assumed lost after two hours (i.e., the time for battery discharge after loss of ac power), provide the results of analysis which demonstrates that the risk increase due to loss of ac power and dc power after 2 hours is within the guidelines of RG 1.174 or RG 1.177 for the 7 day LCO time.

Response:

STP Technical Specifications allow a SDG to be inoperable for up to 14 days. Since the SDG would power the battery charger for the dc system in an event that included a loss of off-site power, this condition bounds the proposed 7 day allowed outage time for an inoperable sequencer. In addition, in the case of an inoperable sequencer, there is a high degree of confidence the SDG can be manually started and loaded within 2 hours in accordance with Emergency Operating Procedures.

7. If an ESF load sequencer and a diesel generator in another division are inoperable, current TS (based on the definition for operability and TS 3.8.1.1.d) would convey inoperability of two of STP's three trains Design basis accident mitigation equipment (i.e., required systems) and require STPNOC to apply TS 3.0.3.

   7.1. Clarify how the new proposed TS 3.8.1.1.h will interact with current TS 3.8.1.1.d and the TS definition for operability.

   Response:

   TS 3.8.1.1.h has the same required action time as TS 3.8.1.1.d because the configuration is similar. In both cases, the plant is in a configuration where there is only one of the three safety trains available to mitigate a design basis accident. An AOT of 24 hours has been accepted as appropriate for this configuration in TS 3.8.1.1.d and f.

   7.2. Explain how the current TS requirement for plant shutdown (when there is a loss of safety function conveyed by TS 3.8.1.1.d) will be maintained when there is an apparent loss of safety function due to an inoperable load sequencer and diesel generator.

   Response:

   An inoperable load sequencer and inoperable SDG on a different ESF train do not result in a loss of safety function. The application of the TS is discussed in the responses to Question 6.

8. The bases for required action F.1 of Section 3.8.1 of WOG STS rev 2 states the following: "The sequencer(s) is an essential support system to [both the offsite circuit and the DG associated with a given ESF bus]. [Furthermore, the sequencer is on the primary success path for most major AC electrically powered safety systems powered from the associated ESF bus.] Therefore, loss of an [ESF bus sequencer] affects every major ESF system in the [division]. The [12] hour Completion Time provides a period of time to correct the problem commensurate with the importance of maintaining sequencer OPERABILITY. This time period also ensures that the probability of an accident (requiring sequencer OPERABILITY) occurring during periods when the sequencer is inoperable is minimal."

8.1. The 7 day allowed outage time for components actuated by the sequencer assumes fully operable offsite and onsite power supply systems. Thus, it is not clear that the 7 day allowed outage time for components actuated by the sequencer is equivalent to the 7 day allowed outage time for an inoperable sequencer. Provide additional justification supporting the proposed 7 day (versus the STS 12 hour guideline) for an allowed outage time for an inoperable sequencer.

Response:

Off-site power is still operable and ESF components that are normally in service are not affected by the inoperable sequencer for SI events without loss of off-site power (LOOP) (Mode I). For events that include LOOP, STP Technical Specifications allow a SDG to be inoperable for up to 14 days. Since the SDG would power the affected components in an event that included a loss of off-site power, this condition bounds the proposed 7 day AOT for an inoperable sequencer. In addition, in the case of an inoperable sequencer, there is a high degree of confidence the SDG can be manually started and loaded within 2 hours in accordance with Emergency Operating Procedures.

8.2. Describe the TS LCO requirement for the condition of an inoperable sequencer and a second inoperable required system, subsystem, train, component, or device associated with the operable sequencers. For this TS LCO, provide justification for the allowed time for continued plant operation. Provide the results of analysis which demonstrates that the risk increase is within the guidelines of RG 1.174 or RG 1.177.

Response:

The most limiting LCO that applies to the two inoperable trains of the affected function would apply. For TS components that depend on the cross-train diesel and which are not started on a Mode I (SI) sequence, the applicable TS is 3.8.1.1.d. As discussed in the STPNOC letter dated February 14, 2002 (NOC-AE-01001214), for systems that get a Mode I sequence, the inoperable sequencer makes the system inoperable. This consequently requires entry into the governing system TS. For some of these systems (e.g. ECW), TS 3.0.3 would apply since there is no specified TS action for two inoperable trains. Since this is within the provisions of the current TS, no risk analysis should be needed.

8.3. Describe compensatory measures (including regulatory commitment to these measures) needed to assure the increased risk is within the guidelines of RG 1.174 or RG 1.177.

Response:

The STP Configuration Risk Management Program (CRMP) manages daily and weekly work risk below a Conditional Core Damage Probability (CCDP) threshold of 1E-06. If weekly work risk profiles approach 1E-06, compensatory measures are taken to minimize the cumulative risk for that week. In addition, a 12 month rolling average of cumulative risk due to maintenance is managed below 110% of the reference average maintenance CDF value.

STPNOC does not believe regulatory commitment to specific compensatory measures beyond the CRMP is required. STP's maintenance configuration history has demonstrated the station's capability to consistently manage the configuration to maintain low risk.

9. Required action B.2 of Section 3.8.1 of WOG STS rev 2 is intended to provide assurance that a loss of offsite power, during the period that a DG is inoperable, does not result in a complete loss of safety function of critical systems.

9.1. The 24 hour TS LCO for an inoperable diesel generator with another component that depends on one of the operable diesels that is also inoperable assumes a fully operable offsite power system. Thus, it is not clear that this 24 hour TS LCO for an inoperable diesel generator with another component inoperable is consistent or comparable to the proposed new 24 hour required action h (i.e., one inoperable load sequencer and one inoperable DG in another train). With an inoperable sequencer, the offsite power system is not fully operable. With an inoperable diesel generator the offsite power system is, however, required by TS to be fully operable. For the proposed 24 hour TS LCO, provide additional justification for the allowed time for continued plant operation. Provide the results of analysis which demonstrates that the risk increase is within the guidelines of RG 1.174 or RG 1.177.

Response:

An inoperable sequencer does not render the off-site power source inoperable. The risk assessment is similar to that done to justify the 24 hour action time for TS 3.8.1.1.d and TS 3.8.1.1.f.

The Incremental CCDP (ICCDP) associated with one inoperable load sequencer and one inoperable DG in a different train for 24 hours (proposed TS 3.8.1.1 action h) is 6.2E-07 using the average maintenance PRA model. This ICCDP risk increase is above the 5.0E-07 core damage risk threshold described

in RG 1.177. The corresponding Incremental Conditional Large Early Release Probability (ICLERP) is 1.6E-08 which is below the 5.0E-08 large early release risk threshold described in RG 1.177.

For comparison, the corresponding ICCDP using the Configuration Risk Management Program (CRMP) risk evaluation tool (RAsCal, zero maintenance PRA model) is 4.7E-07. This is the risk which reflects actual equipment configuration during maintenance for this unplanned and infrequent cross-train maintenance event. The CRMP manages daily and weekly work risk below a CCDP threshold of 1E-06. If weekly work risk profiles approach 1E-06, compensatory measures are taken to minimize the cumulative risk for that week. In addition, a 12 month rolling average of cumulative risk due to maintenance is managed below 110% of the reference, average maintenance CDF value. Therefore, the core damage risk incurred by proposed TS 3.8.1.1.h is considered low, and is also bounded by the risk incurred by currently approved Action f, i.e., two inoperable SDGs for 24 hours.

9.2. Describe the TS LCO requirements for the condition of an inoperable sequencer, an inoperable DG in another train, and an inoperable required system, subsystem, train, component, or device associated with:

1. The operable sequencers,
2. The inoperable sequencer,
3. The inoperable DG, and
4. The operable DG.

For each of these TS LCOs, provide justification for the allowed time for continued plant operation. Provide the results of analysis which demonstrates that the risk increase is within the guidelines of RG 1.174 or RG 1.177.

Response:

The LCO for two inoperable trains of the affected function would apply because it is more restrictive than the TS 3.8.1.1.d action for an inoperable sequencer and an inoperable cross-train SDG. For some systems, such as ECW, TS 3.0.3 would apply since there is no action for two inoperable trains. This is similar to the response to Question 8.2, and no additional risk assessment should be needed for these configurations that are governed by the provisions of the current TS.

9.3. Describe compensatory measures (including regulatory commitment to these measures) needed to assure the increased risk is within the guidelines of RG 1.174 or RG 1.177.

See the previous response regarding compensatory measures.

Attachment 2

Corrected Page 3/4 - 27

TABLE 3.3-3 (Continued)

ACTION STATEMENTS (Continued)

ACTION 19 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

ACTION 20 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. For Functional Units with installed bypass test capability, the inoperable channel may be placed in bypass, and must be placed in the tripped condition within 72 hours.

Note: A channel may be bypassed for up to 12 hours for surveillance testing per Specification 4.3.2.1, provided no more than one channel is in bypass at any time.

b. For Functional Units with no installed bypass test capability,

1. The inoperable channel is placed in the tripped condition within 72 hours, and

2. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels per Specification 4.3.2.1.

ACTION 20A - a. With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

1. The inoperable channel is removed from service or placed in the tripped condition within 72 hours, and

2. The Minimum Channels OPERABLE requirement is met; however, an inoperable channel in the tripped condition may be bypassed for up to 12 hours for surveillance testing of other channels per Specification 4.3.2.1.

b. With the number of OPERABLE channels two less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided:

1. One inoperable channel is placed in the tripped condition and one inoperable channel is removed from service within 72 hours, and

2. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels per Specification 4.3.2.1.

c. With the number of OPERABLE channels less than the Minimum Number of Channels, declare the associated load sequencer inoperable and apply the ACTION required by Technical Specification 3.8.1.1.

TABLE 3.3-3 (Continued)

ACTION STATEMENTS (Continued)

ACTION 21 - With less than the Minimum Number of Channels OPERABLE, within 1 hour determine by observation of the associated permissive annunciator window(s) that the interlock is in its required state for the existing plant condition, or apply Specification 3.0.3.

ACTION 22 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 24 hours, or be in at least HOT STANDBY within the next 6 hours and in at least HOT SHUTDOWN within the following 6 hours; however, one channel may be bypassed for up to 4 hours for surveillance testing per Specification 4.3.2.1 provided the other channel is OPERABLE.

ACTION 23 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within 6 hours and in at least HOT SHUTDOWN within the following 6 hours.

ACTION 24 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or declare the associated valve inoperable and take the ACTION required by Specification 3.7.1.5.

ACTION 25 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 24 hours, or be in at least HOT STANDBY within the next 6 hours; however, one channel may be bypassed for up to 4 hours for surveillance testing per Specification 4.3.2.1 provided the other channel is OPERABLE.

ACTION 26 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, declare the affected Auxiliary Feedwater Pump inoperable and take ACTION required by Specification 3.7.1.2.

ACTION 27 - For an inoperable channel, declare its associated ventilation train inoperable and apply the actions of Specification 3.7.7.

ACTION 28 - With the number of OPERABLE channels less than the Minimum Channels OPERABLE requirement, within 1 hour initiate and maintain operation of the Control Room Makeup and Cleanup Filtration System (at 100% capacity) in the recirculation and makeup filtration mode.

ACTION 29 - For an inoperable channel, declare its associated ventilation train inoperable and apply the actions of Specification 3.7.8.

ACTION 30 - With irradiated fuel in the spent fuel pool: With the number of OPERABLE channels less than the Minimum Channels OPERABLE requirement, fuel movement within the spent fuel pool or crane operation with loads over the spent fuel pool may proceed provided the FHB exhaust air filtration system is in operation and discharging through at least one train of HEPA filters and charcoal adsorbers.